

JULY 25, 1921

Issued Weekly

PRICE 15 CENTS

# AVIATION AND AIRCRAFT JOURNAL



Aerial View of Coney Island

VOLUME XI  
Number 4

Four  
Dollars  
a Year

## SPECIAL FEATURES

PRESIDENT HARDING FAVORS UNITED AIR SERVICE  
BOMBING TESTS PROVE AIR POWER  
OH-4 EMERGENCY FLOTATION GEAR  
ACROSS THE CENTRAL AMERICAN ANDES  
EXAMINATION OF LAMINATED AIRPLANE SPAR

THE GARDNER, MOFFAT CO., INC.

HIGHLAND, N. Y.

225 FOURTH AVENUE, NEW YORK

RECEIVED  
JUL 28 1921

OFFICERS SCHOOL

Entered as Second-Class Matter, No. 24, 1220, at the Post Office, Elizabeth, N. J.



The LANDING GEAR and TAIL SKID, shown above, attached to an **AEROMARINE 39" B" HYDRO**, a number of which the Navy are offering for sale at **\$1500<sup>00</sup>** each, make a *fast flying, slow landing, reliable* aeroplane procurable at a very low cost; an *excellent* machine for *passenger carrying*. This Landing Gear & Tail Skid complete is being furnished by the *Aeromarine Plane and Motor Company*, -- Keyport, N.J. for **\$500<sup>00</sup>** F.O.B. Factory. *Prompt deliveries* can be made on a few sets of this equipment.

**AEROMARINE PLANE & MOTOR CO.**  
TIMES BUILDING  
NEW YORK



*Curtiss*

**DISTRIBUTORS OF THE PRODUCTS  
OF THE**

**CURTISS AEROPLANE & MOTOR CORPORATION:**

THE STATE OF ILLINOIS,  
Branch Sales Office of the parent corp.

THE STATE OF MICHIGAN, EXCEPTING THE UPPER  
PENINSULA

MISS OF THE STATE OF OHIO

THE STATE OF IOWA

MISS OF THE STATE OF NEBRASKA

THE STATE OF INDIANA

MISS OF ALABAMA AND GEORGIA

THE STATES OF OREGON, WASHINGTON & IDAHO

THE STATES OF VIRGINIA & NORTH CAROLINA

THE STATES OF NEVADA AND NORTHERN CALIFORNIA

THE STATE OF NEBRASKA

THE STATE OF WISCONSIN AND UPPER PENINSULA  
OF MICHIGAN

THE STATES OF NEW MEXICO, UTAH, WYOMING, AND  
COLORADO

THE STATES OF PENNSYLVANIA, MARYLAND, DELAWARE  
& SOUTHERN NEW JERSEY

THE STATES OF MINNESOTA, THE DAKOTAS, AND INDI-  
ANA

THE STATE OF KANSAS AND PART OF MISSOURI

THE NEW ENGLAND STATES

THE STATES OF TEXAS, OKLAHOMA, AND UNASSIGNED  
TERRITORIES

ALL COUNTRIES OF SOUTH AMERICA

Curtiss Aeroplane & Motor Corporation,

1600 North Michigan Ave., Chicago, Ill.

Thompson Aeroplane Company,

1925 Woodward Ave., Detroit, Mich.

Floyd J. Logan,

115 Superior Ave., N. W., Cleveland, Ohio.

Curtiss Iowa Aeroplane Corporation,

Fort Dodge, Iowa.

St. Louis-Curtiss Aeroplane Company,

1600 Grand Blvd., St. Louis, Missouri.

Curtiss Indiana Company,

Kokomo, Indiana.

Curtiss Board Aeroplane Company,

Montgomery, Alabama.

Oregon Washington & Idaho Company,

1000 West 12th, Portland, Ore.

Lynchburg Aeroplane Co.,

1011 Wall St., Lynchburg, Virginia.

Ed P. Cooper Aeroplane & Motor Corporation,

1600 Folsom St., San Francisco, Calif.

Grand Island Aeroplane Company,

Grand Island, Nebraska.

Curtiss Wisconsin Aeroplane Company,

1600 Clinton St., Milwaukee, Wis.

Curtiss New Mexico Aeroplane Company,

1600 Main St., Santa Fe, New Mexico.

Curtiss Eastern Aeroplane Company,

100 E. 19th St., Philadelphia, Penna.

Curtiss Northeastern Aeroplane Company,

100 Metropolitan Blvd. N.E., Minneapolis, Minn.

Wilson & Hill Aeroplane Company,

Artesia City, Kansas.

Curtiss New England Aeroplane Company,

Quincy City, Long Island, N. Y.

Curtiss Midwest Corporation,

Quincy City, Long Island, N. Y.

Love Field, Dallas, Texas.

C. W. Watson,

Curtiss Aeroplane & Motor Corporation,

Quincy City, Long Island, N. Y.

**DEALERS**

THE STATES OF MASSACHUSETTS AND RHODE ISLAND

Lynchburg Aeroplane Transportation Company,

7 Central Street, Lynchburg.

PARTS OF THE CAROLINAS

H. L. Morris Company,

320 E. Tryon St., Charlotte, N. C.

# FAITH

The Dayton Wright Company believes in aviation - foresees with calm assurance the services which aircraft will render to Commerce and Industry.

It is pleasing to consider that the opportunity to share in the development and in the accomplishment of its expectations of the aircraft industry is both a privilege and a trust.

Permit us to study your transportation problems. Probably you are one who may profit by the use of aircraft.

## DAYTON WRIGHT COMPANY



**DAYTON, OHIO**



### "The birth of the nation"

# AVIATION AND AIRCRAFT JOURNAL

JULY 25, 1921

AND  
AIRCRAFT JOURNAL

VOL. XL. NO. 4

#### INDEX TO CONTENTS

<b>Editorials</b>			
President Shuts Down United Air Lines	55	Performance of a 300-hp. Hispano-Suiza Airplane	
Booking of Weather Proves Air Power	56	Engine	388
Aircraft Ambulance Field Delivery	56	Relief Expedition of Airplanes to the Fukito Flood	389
Airships in Long-Distance Transport	59	Airstream Notes	390
The Future of Anti-Aircraft Artillery	60	Reactor Renaissance by Airplane	390
Firefield Co Increases Its Staff	60	Italy's Popular Acoustical Equipment	390
McCook Field Bulletin Released	61	H. A. C. Georgia Room	391
The Remington Berthel Airline	61	International Airlines Race	391
A. Paul Germer Sets New-Record Airship	62	Trade Note	392
"We're an American Aeroplane"	62	Trade Note	392
2014-4 Engineering Practices Given	63	H. Y. to Circumnavigate by Flying Boat	393
Examination of Licensed Airplane Pilots	64	Speed Approaches 300 Miles Per Hour	394
Book Reviews	66	Foreign Aerial Transport	395
Across the Central American Andes	66	Aerial Police in Michigan and Canada	395

THE GARDNER, MOFFAT COMPANY, Inc., Publishers

THOMAS-MORSE AIRCRAFT CORPORATION



## THOMAS-MORSE AIRCRAFT CORPORATION

# A Thousand to One

BUILT on what war taught—the Bechtel plant of The Glenn L. Martin Company, in Cleveland, is planned for quick expansion at saddle call.

The Company laid out grounds—located buildings—designed special tools and trained its personnel—with one objective, rapid production of quality aircraft.

Every eight days, a finished Martin Bomber is turned out.

If war comes the Company can shortly reach a production of ten a day.

1000 Martin Bombers can be built for the cost of a modern battleship with its accessories.

What chance would one ship have against 1000 bombers?

What chance would a man armed with a rifle have, attacked by 1000 hornets each carrying a fatal sting?

Think it over!

**THE GLENN L. MARTIN CO.**  
CLEVELAND

Member of the Manufacturers Aircraft Association



L. D. GOREHOB  
PRESIDENT  
W. D. MURRAY  
VICE-PRESIDENT  
W. L. SEAMAN  
TREASURER  
CARLTON NEWBERRY  
GENERAL MANAGER

Vol. XI

JULY 25, 1931

No. 4

# AVIATION AND AIRCRAFT JOURNAL

LAWRENCE E. DUNN EDITOR  
ALEXANDER KLEINER  
EDWARD P. WARD  
RALPH H. LIPSON  
CONTRIBUTING EDITORS

## Finances Basis in Airships

THE announcement that President Harding favors a single department to control all government aviation, military, naval and civil, comes at this time with such surprising suddenness that it is difficult to appraise the full effect it will have on aviation in this country.

AVIATION AND AIRCRAFT JOURNAL, which has pointed many of the arguments in favor of such consolidation, takes pride in the fact that in the issue of March 24, 1931 it forecasted the present situation in the following editorial comment:

"On the eve of his inauguration President Harding made an announcement to the press which is of the greatest importance to aviation in this country. He is reported as favoring the creation of a Department of Defense, headed by one Cabinet officer, which would have three branches of really repeat rank, the army, the navy and the air force. Each would be in charge of its own autonomy."

This news, while hidden in an obscure newspaper report, is deserving to all those who believe that the present method of handling government air activities is unacceptable.

The British Ministry of defense has followed this plan but none of the practical workings of it have passed through the experience of all new experiments. Fundamentally, the idea is sound. Mystery, jealousy and competition have no place in any scheme for national defense. By placing the air force in an equal place with the army and navy, President Harding will be starting right and it is to be hoped that this consideration will prove one of the great achievements of the Harding Administration.

After the above announcement was made, the information was circulated that a premature discussion might endanger the plan. It was therefore allowed to remain as an unrecorded secret.

Meanwhile, on the advice of the National Advisory Committee for Aeronautics, the President took a position on aviation that has been regarded as reflecting departmental views. The President now appears to have issued the arguments of superceded investigation and has decided to approve that plan which makes for efficiency and economy.

## The Bombing Tests of the Warships

WITHOUT detailing the technical aspect of the bombing tests made with the battleship Washington, on which judgment must be suspended pending the issue of an official report, it can nevertheless be said that off the Virginia Capes aircraft proved what their defenders contended, namely, their offensive powers against surface vessels.

A submarine, a destroyer, and an armored cruiser were in turn sunk by aircraft bombs. To be more accurate, the cruiser President, a 5,600-ton ship was sunk by a single 600-lb. bomb. Who can any longer deny the striking power of aircraft?

THE ratio of the overall length to diameter of an airship, called the fineness ratio, has long been recognized as one of the fundamental factors in its design, although its real effect on maneuverability and performance is only beginning to be thoroughly appreciated. The great difference in dimensions between model and full size airships has made it impossible to far to predict performances from model tests alone. Hence development has largely been determined by the performances of individual ships. This has forced the number of experiments to so few units that it has taken a long time to overcome the fallacies and false notions upon which many airship theories were built.

In particular, the idea that a long slender body is required for attaining high speed has had a most remarkable vitality. This fallacy may have been due to the fact that the pre-war Zeppelins all had a fineness ratio of from 10 to 12. As these ships were much faster than their non-ship contemporaries, from which they differed mainly through their shape, it was reasonably assumed that they owed their performance to a high fineness ratio, when as a matter of fact this was mainly due to the suppression of parasite resistance. However, during the war the fineness ratio of the Zeppelins constantly decreased, until in the post-war airship Bodensee it went below 7. More recent experiments indicate that with the proper class of aircraft good propulsive efficiency may be obtained at very much smaller ratios. In fact, some Post-World War ships, which are notable for the high speed they attain with a comparatively small power plant, have a fineness ratio of only 4, while the *Kron*, just purchased by the U. S. Army, is only 6.6 fineness ratio.

Another fallacious theory often heard is that a short ship may be safer for a low resistance but it would be unstable and uncontrollable. The unparalleled success of the Goodyear *Douglas*, with a fineness ratio of less than 3½, has definitely disposed of this objection. More recently the argument has been advanced that a large flat ship of rigid construction would be too heavy for its capacity. This is a perfectly valid point of *rigid construction*; there is almost the present Zeppelin type, which with its heavy wings, fuselage and transverse load distribution is not suitable for very flat shapes without considerable modification.

But here again it must be conceded that most of the majority of the present types will be largely superfluous when the lower fineness ratio comes into general use. In other words, a satisfactory rigidity can be attained on a flat ship with far less structural complication than with a thin hull, and the former will be simpler and more practical in every way.

We believe that the proper design to suit these conditions will soon be forthcoming. When it does, the only remaining limitation will be the size of hangars. For this reason it is of the utmost importance in the consideration of new ship hangars to make them of ample width and height.

# President Harding Favors United Air Service

## Endorses Unification as a Means of Economy and Efficiency

President Harding on July 14 let it be known that he favors the proposal to place all the aircraft services of the Government under military and civil under one central authority.

The New York Times states that:

"There has been an impression that the President was opposed to this plan, especially when Major Gen. Strader, Chief of the Air Service of the Army, asked the Secretary of War to reorganize the Army Air Service into a single department, which was a persistent advocate of amalgamation of the army and navy air services. It was learned today, however, that the President is hostile to favor of the proposed amalgamation and that the Joint Reorganization Commission, which is engaged in preparing plans for a reorganization of the executive branch of the Government, is inclined to recommend the retention of all the Government's aircraft activities."

The plan of President Harding is that amalgamation will not be effected until the Joint Reorganization Commission has reported favorably on the proposal, and that there is no systematic method of avoiding contracts for the construction of aircraft. One branch makes contracts without regard to any other Government aircraft organization, and the President believes that this is detrimental to the building of peace aircraft manufacture in the United States.

"The aircraft manufacturers are dependent almost entirely on Government contracts, and enormous demands are very small, and it is claimed that unless the Government so arranges

its contracts as to distribute them among all those contractors which produce aircraft, meeting Government standards, none of them may be obliged to go out on business."

The plan is also drawn from what was learned today of the President's attitude, which is to merge the amalgamation of the War and Navy Departments into a Department of National Defense. The plan under consideration by the Reorganization Commission contemplates having a Comptroller officer at the head of this department with Assistant Secretaries under him, in charge of the army, the navy and the aircraft service.

Elaborate plans go through John W. Weeks, Secretary of War, and states go through the Commission, and the head of the War Department of National Defense, though also a participant post, then, would be referred to Edwin F. Drury, Secretary of the Navy.

By the amalgamation of the two departments into one the committee hopes to accomplish a saving of at least \$100,000,000 a year, to come about through a joint administration of contracts, the service of the personnel, and distribution of supplies, and the coordination of naval aircraft and other material. This is quite independent of the additional savings already estimated around \$300,000,000 a year, for which the committee has been hoping. Other reductions, such as the reduction of departmental personnel and the prevention of much of the duplication of effort, are now evident in the different services.

# Bombing of Warships Proves Air Power

## Martin Bombers of Army Air Service Sink Destroyer G-102 and Cruiser Frankfurt

The bombing tests of the Army and Navy Air Services are continuing with a view to determining the effect of aircraft bombs upon all classes of warships, later offering two more demonstrations of the vulnerability of surface vessels to aerial attacks. Following the sinking of the ex-German submarine U-117, the destroyer G-102 and the armored cruiser Frankfurt, both ex-German vessels, were sunk by Army and Navy aircraft, and it is claimed that follows the Government's arrangements.

### The Bombing of the Destroyer G-102

On July 13 the former German destroyer G-102 was bombed and sunk by the Army Air Service in the course of the bombing tests now being carried out. The target was a drift of the Virginia Capes and the attacking machines used three bases at Langley Field and Hampton Roads.

Brigadier General Strader, Assistant Chief of Army Air Service, organized and commanded the operations. The attacking aircraft consisted of 14 Martin bombers, 14 DH-4B5 warbirds, 13 SE5 machines, 3 Caproni, and several observation and photographic machines. The Martins and DH-4B5's started at 10,000 feet and bombed while the pursuit machines carried on in Cooper Stoops for bombing, or flying below deck.

### The Bombing of the Frankfurt

On July 15 the bombing tests of warships were resumed when 100 DH-4 and 50 SE5 aircraft attacked the ex-German cruiser Frankfurt.

The tests conducted with the Frankfurt appear particularly important from the fact that this vessel possessed aerial protection, whereas the submarine U-117 and the destroyer G-102, previously bombed and sunk by aircraft, were unarmored ships. The Frankfurt was one of the later types of German light cruisers, laid down in 1893, and completed on September 1895. She took part in the battle of Jutland and was reported

between 2,000 and 2,500 ft. altitude and the Cooper bombers dropped a total of 1,000 bombs.

The first attack list was made by one of the DH-4B5's at 10,25, and the target began to sink rapidly. It was then that the second direct hit was made by one of the Martin machines. The bomb struck alongside and the target sank at 10:45. The attacking machines used less than half their bombs. The 28 Martins and DH-4B5's dropped 250 bombs of which 50 were direct hits, while the pursuit machines dropped 40 Cooper bombs.

Brigadier General Strader flew from Langley Field in a DH-4B5 machine and was over the target when the first machine arrived. He followed both the pursuit machines and the Martin bombers over the target, frequently approaching at a low altitude to observe the effect of hits.

Photographs were taken against machines having fused bombs and destruction was attained at seven-mile intervals from the target.

Major Gen. Charles T. Menoher, Chief of Air Service, watched the trials from one of the escorting ships in the company of foreign air attachés.

### The Bombing of the Frankfurt

The second attack was made by a division of two Army Martin bombers piloted by Lieutenant Varni, Carlson and Farnsworth of the Marine Corps. The three machines dropped on 500-lb. bombs, but scored no hits.

The third conducted with the Frankfurt appears particularly important from the fact that this vessel possessed aerial protection, whereas the submarine U-117 and the destroyer G-102, previously bombed and sunk by aircraft, were unarmored ships. The Frankfurt was one of the later types of German light cruisers, laid down in 1893, and completed on September 1895. She took part in the battle of Jutland and was reported

July 20, 1921

AVIATION

as the first ship to sight the British as the fleet came in contact. She was sunk by her crew at Scapa Flow after the war ended, but was salvaged and sufficiently renovated to be able to cross the Atlantic under power. The Frankfurt had a maximum speed of 20.5 knots, a maximum speed of 20.5 knots. Her battery consisted of eight 6-in. guns, 10 3-in. torpedoes tubes. Her armor protection comprised a side belt 5.9 in. tapering to 3.9 in. forward, and 3 in. on deck, and a protection deck of 1.5 in.

The bombing was commenced with the fifth attack which was made by the First Division of naval F-5-L seaplanes piloted by Lieutenant Thomas, Keeler, Beaufort and Gurney, and made a dive to a height of 1,000 ft. The three machines dropped six 500-lb. bombs but failed to score any hits.

The sixth attack, made by three Army Martin bombers piloted by Lieutenant Crozier, Gandy and McDonald, also proved fruitless, for as far as was made out of the twelve 500-lb. bombs dropped, this attack rolled the light bombing tests, and at 228 ft. on the heavy bombing plane barge.

The first heavy bombing attack was made by the Seventh Division of naval Martin bombers commanded by Lieutenant Commander Hartlett. The three machines dropped four 500-lb.



Ex-GERMAN ARMED CRUISER FRANKFURT SUNK BY A 500-LB. AIRCRAFT BOMB ON JULY 15

bombs. Fifty-four bombs, weighing from 250 lbs. to 500 lbs. each were dropped in the first phase from F-5-L seaplanes and Martin bombers, while in the second phase twenty-four 500-lb. bombs and 600-lb. bombs were used. Two of these were 528-lb. bombs, dropped by naval Martin bombers, and fourteen were 600-lb. bombs dropped by Army Martin bombers.

The bombing attacks started at 8:22 a.m. by the Fourth Division of naval F-5-L seaplanes piloted by Lieutenant Commander Stone, the other pilots being Lieutenant Eddie and Nolte, and by the Fifth Division of naval F-5-L seaplanes commanded by Lieutenant Price, with Lieutenant Stump and Wilfusson in the plane. The six machines dropped twelve 500-lb. bombs and scored one direct hit amidships of the Frankfurt's forecastle.

The second attack was made by a division of two Army Martin bombers piloted by Lieutenant Varni, Carlson and Farnsworth of the Marine Corps. The three machines dropped on 500-lb. bombs each, but scored no hits. No direct hit was made, although one bomb came near hitting the foremast. Big splashes of water went up as the bombs dropped amid the ship and the commotion caused by their detonation was felt against the sides of the observation vessel at a distance of several thousand yards.

The third attack was made by the Second Division of naval F-5-L seaplanes piloted by Lieutenant Varni, Carlson and Farnsworth of the Marine Corps. The three machines dropped on 500-lb. bombs, but scored no hits.

The fourth attack was made by an Army Martin bomber piloted by Lieutenant Wickes, who dropped six 500-lb. bombs, making one hit. This bomb struck about of the aft superstructure, showing deck wreckage into the air. After this attack there was an hour's drift during which the airship Frankfurt took the official observers on board the Frankfurt to determine the damage done to the ship. The ship was found to be in condition to sail again, but was still listing to the port side.

Captain Larson's division did not at once change their formation to single column, his machine began circling the target. Only four of the Martin bombers actually dropped bombs, however, all of them, but their work was so effective that it soon added a half to the expectations of these naval officers present who had insisted that the Frankfurt could not be sunk by aircraft bombs. Of the bombs dropped by the four Army Martin bombers two landed upside down from the 5000-ft. altitude at which the attack was made. These direct hits tore



A PLANE OF DH-4B BOMBER-LIGHTERS LAYING DOWN EN-GERMAN DROPSHIPS G-185 OFF THE VINCENNES COAST  
Photo International

mask of the superstructure away and caused the target ship to sink violently, but she was still afloat when the aerial bomb was dropped. It was then, at 4:25 p. m., that the single bomb which sank the target ship was dropped. This bomb did not hit the target, but it alighted off the stern of the boat and after a short time exploded at the Frankfurt aerodrome 1,000 feet out of the water. A great amount of water shot up on both sides of the damaged ship, evidence that the bomb had exploded almost directly under the forward keel. As the Frankfurt settled back it was

evident she was a goner. Her shattered bow was resupplied in and her compartments were filled with water, for the ship took a list and twenty-eight minutes later she went down stern first.

A division of naval N.Y.C. seaplanes was circling the target at that time, prepared to finish the job of the Army, but this was well done that no help was needed. The Frenchmen stuck before the official observers on the Frankfurt could board her to determine the success of the job which sent her down.

## Aircraft Accelerate Film Delivery

Aircraft played an important role in connection with the Dempsey-Carpenter flight, when films taken at the megalopolis were delivered to studios bound for Europe after they had settled. In this manner an Aeromarine film had spread up the Mississippi in eight pictures in three days. The picture was started at North Platte at 7 a. m. In the meantime had been developed and reduced to the condition the studios at Eastman was already out of one, and the flying boat caught up with it in less than an hour and dropped the roll of film on the dock of the vessel.

The Newspaper Enterprises Association used airplanes to speed up the delivery of the first pictures on the Pacific Coast. Two flights were made on July 18, 1921, at 3:00 p. m. Saturday and at 12:15 p. m. Monday, about 4800 miles apart, the pictures of the last were delivered in San Francisco.

The plates were taken from the areas to airplanes about a mile away by motorcycle carriers. The machine took off at 3:00 p. m. for Cleveland, where they landed at 4:55 p. m. after stopping at Bellwood, Pa., to refuel. An hour after the arrival of the pictures on Cleveland the papers had published a special edition containing the film. From Cleveland the plates were taken by automobile to Chicago. To the train they were loaded in baggage cars fitted out as a dark room, so that the plates were developed enroute during the night. The train arrived in Chicago at 4:55 a. m. Sunday, and at 8:00 the pictures were on the way to North Platte, Neb., by the Air Mail.

Arriving there at 9:00 a. m. they were transferred in the railroad, and taken to Rock Springs, Wyo., where another Air Mail machine carried them on to San Francisco, only stopping to refuel. The pictures were delivered to the office of the San Francisco Daily News after they arrived at the midroute at 12:35 p. m. Monday.

An Ansabia, a twin machine, the property of Ralph Dugay of Chicago made an excellent flight from that City on July 19, 1921. From Chicago he took off at 7:30 a. m. The flight of nearly 700 miles was accomplished in a driving rain. The Ansabia machine arrived at North Platte at 2 p. m. with plenty of time for the crew for the west winds arrived at 3:30 p. m. A stop for fuel was made at Denver.

A fast flight from Los Angeles to Chicago and back to fetch pictures of the recent Carpenter-Dempsey flight for the Los Angeles Examiner was made by Frank Clarke on a Fokker fitted with the Blériot-Soleil 6B engine. This fine performance made it possible for pictures taken on the rampage on July 2 to be packed and on the streets of Los Angeles on the evening of July 4.

The outward trip from Los Angeles to Chicago was made with a passenger in 50 hr. Flying time including two overnight stops. At Chicago an extra tank was fitted in the passenger seat and the trip back home was made in 18 hr. Flying time with one overnight stop at Salt Lake City.



DIAGRAM SHOWING NEW YORK-DEMPSEY-CARPENTER FIRST FLIGHT WITH CARRIERS ARRIVED IN CHICAGO IN 48HR.

## Airships in Long Distance Transport

The following extract which is contributed to the London *Observer* by Lord Headlam of Buntingford sheds an interesting light on the commercial possibilities of airships with particular reference to their use in British lands. Owing to the financial retrenchment policy adopted by the British government all but the most modest airships of the Royal Air Force were scrapped after the armistice. According to recent advice given the R.A.F. referred to in the article which follows has now been scrapped in order to give the air force space in the R.M.L. the more modest rigid airships.

The new Secretary of State for Air, Major F. Guest, M. P., came to a wise decision when he reversed, or rather suspended for a further period, the policy of his predecessor Mr. Winston Churchill, who had the idea that the R.M.L. should never have been disbanded at the armistice. So it had been decided that, unless a commercial syndicate came forward to take over the existing airships and their organization everything should be scrapped and the airship department closed down on May 1. A definite directive, however, until August 1 has now been decided upon, and it is hoped that a group of leading shipping and engineering concern may come forward to take over the existing airships and the new airships which have cost together so many millions, for a sum perhaps only a very small proportion of the original expenditure.

As regards airships, there can hardly be any doubt that for long-distance inter-city journeys, such as England to Egypt, or India, to the Far East, in West, East, and South Africa, airships rather than the airplane must eventually be the means of our conveyance. Before the end of 1920 one of our airships had spent 300 hours in the air without coming down, and although the record of the R.M.L. has been broken by the German *Zeppelin* *Thuringia* and back, a distance of over 2,400 miles, it is also not generally realized that over 2,600, 800 miles were flown during the war by airships of different types without accident.

We have now in this country four large airships, R.33 and R.32 of British make, and L.40 and L.71 built in Germany in 1918 and landed over or in under the French terms, besides two smaller ships of no real value for long-distance traffic. L.72 is the largest sailing at present in existence, although the *Empire* in Germany is thought to be larger. The *Empire* could make 1000 miles in 24 hours, and two types of small or variable dirigible, on a flight as far as from Bedford to Egypt, performing the journey of 2,000 miles in a little over 60 hours. Against this our own R.36, our biggest British-built airship, could not fly with more than a ton of useful load to Egypt in about the same time. It is interesting to note in regard to L.71 that the German designers and builders intended him to fly by himself to Japan without a stop from Germany, and in the case of our new airships are ready to deliver them to Japan in that way.

### Flight Service to Paris

Any interest remains to know that to make a start it has been suggested that R.36, which can take fifty passengers, and is fitted with comfortable day and sleeping accommodation, will probably be run during the latter half of this summer between Paris, English stations, say Coventry, and certain towns on the Continent such as Paris, Brussels, or Amsterdam. It is intended also to make this service a night one, so as to provide a number of crossings when there is no other service available. The cost of the passage will be £100, or £100 and a half. This compares with the cost of a first-class train, a first-class motor-car, or a first-class boat, a crossing of about twelve days. Of course, to Egypt and so on to ports in Asia and Africa a higher charge would have to be made for over-crowded berths. But an over 34,000 letters of an average weight 8 oz. in 1920 this scheme involves the creation of additional crossing berths, and it may be August before this is accomplished, although most of the material for them is in stock already. These short services are better than none, but a crossed period will be the use of the *Macmillan* or a *Chesnay* or similar service. The distance is too small to be a real loss.

It may be asked, why has the number been so neglected, and why were so few paid to the companies to run the R.M.L. The answer can be found in two directions. First of all, there was the expense of building ships, which were R.M.L. hasty thought to be absolutely necessary for airships, a ship after costing more than half the ship itself. But the mounting cost systems have now superseded the need of a ship almost entirely, except for docking purposes, to use a蒸气船, and insurance expenses, as Puffins, with R.M.L. have been so successful that this has been done, and the cost of an airship can now be set to her owners to practically any weather.

### Germany Aiming for China

But it is not only in England that attention has been given to long-distance to airships. In America a company has been formed with a large capital to establish airship service between various points in the United States, and eventually with the object of linking up America with England and the Continent over the Atlantic. The first step is to be to link America with Europe, while Italy is continuing the use of her *Zeppelins*. In America, which did such good work in *Tropics* in the last war, *Prussia* is spending about a million sterling that year on airship services, and, as before mentioned, Germany is only waiting until the expiration of the clause stipulated by the Treaty of Versailles to start airships again on a big commercial scale. It is natural, therefore, that other nations are regarding the value of the airship as a means of transport, and the value of a million which is all that the *Zeppelin* service here requires to finance its expenditure for the next six to eight months does not make a very heavy show, considering the other circumstances, alongside the effects of other countries.

The second reason for the decline in interest in airships is to be found in the fact that the supporters of the airships are severe critics of the airship. Many of these deny the possibility of use in time of war, and to some extent these critics are right in their conclusions. This can be shown that the enormous size and inefficiency of a dirigible make it an easy and vulnerable target. And the use of non-flammable hydrogen gas is as yet impractical. But, after all, the Germans used airships more successfully over the North Sea, from Borkum in the northwest to the Norwegian coast in the northeast, during the greater part of the recent war, and at the beginning of the war the *Empire* was flying from France to England, brought down by the fact that, whereas it had been successful in flying, we had none, and while they could locate our Fleet we could not locate theirs.

There is no doubt, therefore, that airships of some sort are necessary to a modern fleet, and even if they have to be protected by aeroplanes in the same way that battleships are protected by destroyers from submarines, that is not an insuperable objection.

### Financed Posts

Now let us consider a long-distance service of London to Africa. If a *Zeppelin* which would readily show the important advantages of a dirigible as a half-way house, to Karachi. The actual flying time from London to India would be about 100 hours. To this date must be added, say six hours to Egypt for accommodation and refuelling with hydrogen and fuel, making a period of about four days, or say four and a half days. This compares with the time taken by the *Empire* from London to Cape Town, a distance of 10,000 miles, a crossing of about twelve days. Of course, to Egypt and so on to ports in Asia and Africa a higher charge would have to be made for over-crowded berths. But an over 34,000 letters of an average weight 8 oz. in 1920 this scheme involves the creation of additional crossing berths, and it may be August before this is accomplished, although most of the material for them is in stock already. These short services are better than none, but a crossed period will be the use of the *Macmillan* or a *Chesnay* or similar service. The distance is too small to be a real loss.

so that losses would be over £200,000 a year per service, less Post Office charges.

To run such a service effectively six dirigibles would be needed, of which we now possess four. Two more airships are therefore needed, which would cost in round figures £250,000 apiece. In addition to these there would be some as replacements for Army, coastguard, marine and basea needed of about £100,000. At £100,000 per airship the required number of dirigibles would cost about £250,000. The amount £250,000 is the necessary to start a service to the East, with six airships with properly equipped bases, or say, £1,000,000 in all, allowing £100,000 for working capital which would be necessary to a company undertaking this enterprise.

#### And for Fighting Fleets

Finally let the airships critics, as well as the public, remember that seaplanes are useful for many purposes for which seaplanes are not suitable. For the purpose of a coastal survey of land or sea areas, however no program at a very slow speed is required. For the purpose of surveying the coast, or the location of shoals of fish, would be most valuable to the coast surveyors and owners a larger and cheaper supply of fish for our population here and far afield. Harbors and harbored in particular always need to be cleaned, and while their supply seems unnecessary the demand for them is enormous. The use of H.M.S. to assist in the maintenance of the Derby Day traffic is not the only way of keeping the lighter ships in the coastwise trade in existence. There again, there is the exploration work to be done over unknown unexplored and undeveloped country like Central Africa, Western Russia, South-Western China, and parts of Tibet and the country north of the range of the Himalayan. There are great possibilities of surveying country unknown countries much more cheaply and effectively by airship than by any other means. Investigation of meteorological phenomena could be done at a cost we can measure in the cost for four or five days consecutively.

But at the moment every effort should be made to develop the necessary aspect and considering the enormous potentialities for national welfare of many kinds, I hope most earnestly that the Government will continue to provide for airship operations. If it can be done, and another aeronautical group has not been formed to take care of the airship, it is now very hard—almost impossible—to find a few airship experts, and at least a year should be allowed before any final step is taken to disband the small but magnificently keen body of experts, or to swap airships and their organizations which have been over forty suffices starting during the last few years.

#### The Future of Anti-Aircraft Artillery

By Robert V. Morris

No progress in development of strength, in possible unless we are willing to study and analyze the weak points in war defense, and seeking more immediately safe military strength than a refection of the requiring facilities left by the comfortable traditions that methods and methods which have been used in the past must be fairly all right.

In discussing anti-aircraft artillery it must be recognized that it is still in its infancy, and its aspiration is a new thing, and anti-aircraft fire is still more recent.

A certain amount of time will always be necessary to get the projectile up to its point of least. During this time interval the target may move an any point in a sphere of considerable diameter. Though it may be possible to point the target, to be at any point in such a sphere in perfect time, it is unlikely to have already been on its course, or to within a radius of a few miles, during the first few seconds. Also, the target is not likely to slow up when under fire, but will generally proceed at full speed.

For practical purposes then the total weight should not be given to all points within the theoretical sphere. Rather should an endeavor be made to assume a shape as figure which would indicate the future position of the airplane in the majority of cases.

Targets will be found at altitudes from the 100 ft. of the untrained planes to the 15,000 ft., or more, of the photographic reconnaissance planes. Fighting planes, in the course of duty, may go to extreme heights though it is perhaps safe to say

that fully three-quarters of ordinary flying is at 10,000 ft. or under. Certainly of anti-aircraft artillery could effectively be used, the aim would be to lay two or three altitude to be of greatest service value. During the lower levels the targets go, and advancing that at the most extreme altitude the artillery has the chances all against it, let us consider the more thickly infested regions, with which artillery must deal—say from 5,000 to 10,000 ft. altitude.

Artillerymen perhaps the majority of planes are found below 20,000 ft. take the 10,000 ft. as the average altitude, not too far from the truth. The angle of flight of the projectile goes up to 10 degrees at 10,000 ft. or 6° at 10,000 ft. the angle of deflection 170 deg. to 25 deg. to about 12 sec after the angle is as low as 30 deg. to 35 deg. For example at 45 deg. the time is about 9.5 sec. From scale we find that the projectile will travel in the 10 sec region is equal to 1.5 spheres 100 yards in diameter, or 1000 ft. or 1000 ft. the probability area is substantially exactly what is the angle of deflection.

From an examination of different angles of fire and altitudes the conclusion may be made that with the latest development of materials, the more fact that the projectile will require considerable time to travel through the air does not necessarily provide anti-aircraft artillery from becoming a liability. The angle of deflection is increased with the angle of the flight of the target and the time interval required in the flight of the projectile do not necessarily preclude the development of anti-aircraft artillery as an effective defensive arm. The future development will depend chiefly upon the situation of dead time and the continuous and precise adjustment of personnel, the elimination of the elimination of personnel and of personnel errors, the elimination of probability free results. This indicates the development of reference instruments to perform all the fire control adjustments not requiring personnel direction. (x) adjustment of fire by observation of a secondary target will become more feasible as more precise and automatic fire control is developed, and (ii) the development of anti-aircraft artillery when more perfected, will greatly simplify the task of the anti-aircraft officer, to release our air-borne as our coast defense release our navy—J. M. of U. S. Artillery.

#### Fairchild Co. Increases Its Staff

Lt. L. McGehee, lately of 24 Squadron, First Army Observation Group, Air Service, has recently been retained by the Fairchild Aerial Camera Corp.

McGehee graduated from the University of California and was one of the first commercial photographic pilots in the U. S. Army Air Service. He did extensive work in France and has actually done and served while at work with Captain Stevens and other officers of the Photographic Section, 3000 square miles of territory in the United States. The inventory comprising the 300 square miles of Camp Hearne, was not only done over but the resulting mosaic was pieced and brought up to the present efforts to give the precision and accuracy of one set of maps.

At McCook Field, Dayton, Ohio, he flew and personally assisted in a series of tests to determine the most efficient and satisfactory aerial equipment to be adopted by the Air Service. The mosaic of Washington, photographed in 1918, was one of the first attempts completely to photograph a city and its environs. This was due to the efforts of Captain Stevens and Lieutenant McGehee.

Laurensen McGehee is now conducting a series of tests which it is expected will increase the commercial possibilities of the aerial camera by producing accurate survey and precise maps.

#### McCook Field Balloons Released

We are informed by the Chief, Information Group, Air Service that the Office of the Chief of Air Service has on hand a number of small balloons of Model No. 1 for balloon which have been declared as surplus. Applications and offers will be sent to responsible manufacturers, designers, engineers, and others engaged in aeronautical endeavors, upon request.

## The Remington-Burnelli Airliner

The following additional information is available with regard to the Remington-Burnelli two-engined passenger carrier and the Arctic Engineering Corp., which was illustrated and summarized described in the July 4 issue of AVIATION AND AUTOMOBILE JOURNAL.

The R-B Airliner was built with a view to deriving the maximum benefit from the advantageous features of a twin-engined type without, however, incorporating its disadvantages, the desirability of affording easy access to the engines in flight, the use of a single hull, and the use of a single hull. The majority of the two engined class together answer the purpose of reducing the turning moment when the machine is flying on one engine only. By combining the nose of the conventional tailless fuselage and the outboard engine mounts and their housing into a unit of frontal area, a large amount of parasite resistance was done away with. At the resulting fuselage of large width, located in the shape of an inverted, it is ready to contribute to the lift of the airframe, with a corresponding decrease in the wing area.

Wing tunnel tests show that the body has a lift at zero angle of 36 sq. ft. of 5 lb./sq. ft. The center of pressure runs approximately mid. of the fuselage, as the designer's main effort was to eliminate with C.P. runs on the fuselage. The utilization of the fuselage area as a sustaining surface, however, is inefficient, eliminating a secondary propulsive force as a primary sustaining factor.

The nose landing gear of the machine allows a direct landing gear attachment to the fuselage, whereby the necessity of carrying the landing gear load through the wing train is done away with. This makes for greater safety and structural efficiency. A further advantage of this design is that engine vibration or propeller breakage will not materially effect the strength of the wing train. The fact that the machine uses a deep section high-lift wing—the Glenn Martin M-2—makes

it possible to have the large wings with a single bay train, which further reduces parasite resistance. The general characteristics of the R-B Airliner, which was originally described and illustrated in our July 4 issue, are as follows:

GENERAL CHARACTERISTICS OF THE R-B AIRLINER	
Span and free wing area	100 ft. 0 in.
Length	45 ft. 0 in.
Width	10 ft. 0 in.
Height	10 ft. 0 in.
Wing area	1,000 sq. ft.
Area of tailplane	120 sq. ft.
Area of rudder	120 sq. ft.
Area of elevator	120 sq. ft.
Area of fin	120 sq. ft.
Area of fuselage	120 sq. ft.
Wing aspect ratio	1.50
Wing loading	10.00 lb./sq. ft.
Wing thickness	1.50 in.
Wing camber	0.00 in.
Wing dihedral	2 deg.
Length of fuselage	30 ft. 0 in.
Width of fuselage	10 ft. 0 in.
Height of fuselage	10 ft. 0 in.
Weight empty	6,000 lb.
Weight loaded	10,000 lb.
Passenger capacity	12
Passenger capacity (seated)	12
Passenger capacity (standing)	12
Cabin height	5 ft. 0 in.
Wing span	100 ft. 0 in.
Wing area	1,000 sq. ft.
Wing thickness	1.50 in.
Wing camber	0.00 in.
Wing dihedral	2 deg.
Length of fuselage	30 ft. 0 in.
Width of fuselage	10 ft. 0 in.
Height of fuselage	10 ft. 0 in.
Weight empty	6,000 lb.
Weight loaded	10,000 lb.
Passenger capacity	12
Passenger capacity (seated)	12
Passenger capacity (standing)	12
Cabin height	5 ft. 0 in.

The following remarks by Bert Acosta, test pilot for the Arctic Engineering Corp., on the behavior of the machine when flying on one engine, are of interest to all aviators.

"Plane handles remarkably easy and is very steady on landing. Longitudinal control is excellent. Acceleration on take-off is very rapid. Visibility is excellent. Visibility is very good."

The development of the R-B Airliner is due to the joint efforts of George C. T. Remington, who financed the enterprise; Vincent J. Burnelli, chief engineer and designer; William P. Bellotte, assistant engineer, is charge of suspension and John Clegg, factory superintendent.

## A Fast German Semi-Rigid Airship



THE GRAFT-ZEPPELIN AIRSHIP LZ 127, WITH A SPAN OF 760 ft., 540 cu. ft., 540 cu. ft., WHICH HAD A SPEED OF 74 M.P.H. THE KEEL WAS A GLOBE OF STEEL TUBING.

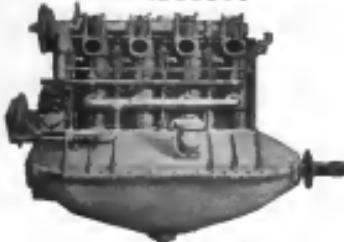


# 5742 Aeronautica Engines For Immediate Sale

Twenty-four makes:

ANSON	BL-2	CANADA	REO	SPARK-PLATE	GENERAL	FARNEFEST	SHAWNEE
BENTLEY	CHESTER	HALL-SCOTT	DETROIT	LAVEROSSE	GEAR	THOMAS-MORSE	WRIGHT
BENTLEY	CLYDE	ANZANI	DETROIT	LAVEROSSE	FRASER	RUSSELL	SCHENCK
BENTLEY	FORD	ANZANI	DETROIT	LAVEROSSE	FRASER	RUSSELL	SCHENCK

HALL-SCOTT



ANZANI



BUGATTI



LIBERTY

Prices Range from \$50 to \$600 per  
Single Engine (except Liberty Twelves)

Never before, and very probably, never again will there be such an opportunity to purchase aeronautical equipment under such favorable buying conditions as those afforded by this War Department Sale. The quality of the material is of the highest—the prices are unbelievably low.

For a striking instance—a new engine as low as \$100.00! Many motors in excellent shape at \$50 and \$60! Practically every type of engine is included in the twenty-four different makes of foreign and domestic power plants.

And then there are the other offerings—plane parts complete with motors; sea sleds at enormous reductions in price; hangars and all the great quantity of material that was gathered for American Air Service in war.

Every item of the long list is of compelling interest. You will find motors and other equipment at condition quoted at figures lower than new. Send for the Catalog and get a comprehensive view of the values.



## Prompt Action Earnestly Advised

Write for Descriptive Catalog

Complete details concerning all material offered, together with prices and terms of sale, are given in an illustrated catalog which will be sent to any person on request. WRITE  
FOR YOUR COPY TODAY

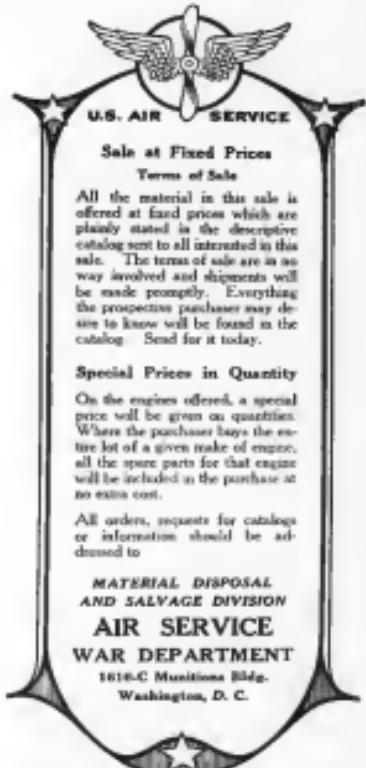
Sale of



# SURPLUS AERONAUTICAL EQUIPMENT



# SURPLUS AERONAUTICAL EQUIPMENT



## Sale at Fixed Prices

### Terms of Sale

All the material in this sale is offered at fixed prices which are plainly stated in the descriptive catalog sent to all interested in this sale. The terms of sale are in no way involved and shipments will be made promptly. Everything the prospective purchaser may desire to know will be found in the catalog. Send for it today.

## Special Prices in Quantity

On the engines offered, a special price will be given on quantities. Where the purchaser buys the entire lot of a given make of engine, all the spare parts for that engine will be included in the purchase at no extra cost.

All orders, requests for catalogs or information should be addressed to

## MATERIAL DISPOSAL AND SALVAGE DIVISION

**AIR SERVICE**  
**WAR DEPARTMENT**

1616-C Munitions Bldg.  
Washington, D. C.

# Examination of Laminated Airplane Spar\*

**Request for Examination.** A section of a laminated airplane spar forwarded by the Air Board to the Forest Products Laboratories of Canada, Montreal, for examination was received May 14, the request for examination coming through Dr. A. S. Eve of McGill University. It is understood that the spar was cut and that the section was taken had passed defective, and that the cause of that was sought.

**Identity of Wood.** All the laminates were identified as Douglas fir (*Pseudotsuga menziesii*, Sud).

**Adhesive.** The adhesive, so far as could be determined from a small amount scraped for examination, is an animal glue, probably a hide glue.

**Mechanical Condition of Spar.** From the section submitted the original strength of the spar appears to have been ap-



CROSS-SECTION OF LAMINATED WING SPAR

markedly reduced as a result of the separation of some of the laminates, particularly those near the center of the spar. The removal of connections and expansion which takes place in wood in response to changes in the relative humidity and temperature of the air cause, according to doctrine, with reference to the animal glues. As a general statement radial shrinkage is only about three-fifths as great as longitudinal shrinkage, longitudinal shrinkage usually being so small as to be negligible for practical purposes. The accompanying photograph shows a cross-section of the spar through the area specified (i.e., separated) section. When the laminates of the spar contracted or expanded with changes in moisture conditions laminates C and E, being practically flat save for transversal holes, shrank, although not appreciably more than laminates D, which is a quarter sawn (or radial) board, the resulting stresses finally causing failure at the points and a resulting reduction in the strength of the spar.

At various points in the section the laminates separated between laminates D and those on either side of it so that daylight could be seen between them. At the section photographed there was complete separation at the joint indicated, namely, that between C and D, where the difference between the directions of the annual rings is a maximum. The stresses at bending, although of right angles to those brought about by the unequal expansion and contraction of the laminates,

would doubtless contribute to the separation of the laminates at these points, making it more susceptible.

Stress would not at the joint between laminates B and C and at that between F and G but would be smaller, as indicated by the directions of the annual rings. Very probably, however, the original strength of these points has been somewhat reduced.

The following rules should be observed in laminating construction generally:

1. All material should be quarter sawn if possible.
2. Quarter and flat sawn laminates should not be used in the same piece of work.
3. All laminates should be brought to the same moisture content before gluing up.
4. Laminates in the same piece of work should have approximately the same specific gravity.
5. All laminates in the same piece of work should be of the same species.

In the case of the spar examined rule No. 2 had not been followed, with the result indicated above.

## Book Reviews

**THE DYNAMICS OF THE AIRPLANE.** By Kenneth P. Williams, (John Wiley & Sons, 136 pp., \$5.00).

Mr. Williams is Associate Professor of Mathematics at Indiana University, and during 1919 attended some lectures by Professor Marcelli at the University of Paris. The preface states that the book is an outgrowth of those parts of Professor Marcelli's lectures that were of particular interest to the author. Questions of design and construction are barely mentioned. The book is intended for students of mathematics and physics, and may be of interest to aerodynamics.

From this point of view the author has done an excellent piece of work, which no doubt will be largely used by teachers and students of physics and mathematics.

The book should also be of service to students of aeronautical engineering, particularly in the early stages of their work, as certain fundamental aspects of aeronautical theory are very clearly set out.

While for a purely mathematical treatise on the subject, the book may be claimed as elementary, it is very sound and clear.

Beginning with a consideration of the plane and enclosed surfaces, Professor Williams develops, somewhat after the style of French authors, theories regarding straight bars, beams, plates, elliptical angle, etc. Damped and forced oscillatory motion. The well known empirical equations for times of ascent are given.

The relation of propeller and motor characteristics is dealt with graphically. Performance and Radius of Action are but briefly dealt with.

The author is not so sound in his treatment of stability. The only value of the two chapters on this subject is to permit a simple rational treatment of motion in three dimensions, and the criterion of stability.

**STABILITY FLIGHT.** By Lt. Col. B. de Villeval. (46 pp. Charles Space, London.)

In view of the growing interest in soaring flight, this pamphlet is timely.

Colonel de Villeval collects and criticizes the views of a number of observers of bird flight such as Lord Rayleigh, Prof. Sir George Stokes, Prof. J. D. B. S. Blakesley, and others, and comes to the conclusion that their observations of the motions of soaring flight is possible based on the following data:

The wind in respect to the earth may be assumed to be practically horizontal. The wind may be assumed to be uniform. The bird may be assumed to supply no energy.

The author thus summarizes by simple mathematical methods, that with the above assumptions, a bird may move steadily forward by casting flight, and change of altitude.

\* Technical Memorandum No. 4, Air Board of Canada.

\*\* It is a distance approximately equivalent to eight miles to the nearest 1000 ft.

† i.e.—That is a distance approximately equivalent to the nearest 3000 ft.

# Across the Central American Andes

**From hand to hand.** Honduras, G. A., states that the first aerial flight made in that country, in the course of which the Central American Andes were crossed, has been effected by Don Ivan Lauck on a Bristol Fighter type P.F.B. The route traversed was between San Pedro Sula and Tegucigalpa, the capital of Honduras, a distance of some 200 miles which was covered as I for 2000 sec. During the flight an altitude of 10,000 ft. was reached.

Mr. Lauck, during the late war served in the Royal Flying Corps with the rank of Sergeant-Pilot, and afterwards became commanding officer to AIRCRAFT JOURNAL, before that publication merged with AIRPLAN. He has for the past year been Chief of Aviation of the Republic of Honduras and in that capacity he has done a great deal of preliminary organization work, which has now been crowned by his flight across the Central American Andes. In a letter to the editor, Mr. Lauck makes the following interesting details of his trans-Andean flight:

"Early in the morning of the 18th (of April) I took a flight with Dr. Walker as passenger in order to test the results of altitude and weight carrying. Dr. Walker weighs 200 pounds and I took an additional 100 pounds of sand. Descended after reaching an altitude of 14,000 ft., but on landing my tail skid hit a rock and broke two wires in No. 7 bay, which was more than difficult to repair.

"After many vexatious delays all was ready in start the next at 4:15 p. m. but it was 50 sec. late due to the difficulty of getting oil from the oil extracting factory. The oil gauge was not working, and the barometer was all wrong, as it only showed 35000 feet. Made up and 10000 feet on full throttle. It was really too late to start on such a trip over uncharted territory that probably did not contain a single place in which the machine could land safely in case of motor trouble. But they were more than anxious about the machine in the capital, and as the weather would probably be worse to-morrow, I decided to make the attempt.

"At 4:35 p. m. I started out across a narrow and very rough field and took off directly over the country and towns. My cargo consisted of three box cars, maguey, typewriter, fire wheel, strings, tools, etc., two undershirts, V. G. tail slide, etc., or a total of approximately 250 lb. Almost immediately the engine began to overheat and I packed back to half throttle and a moment later landed south steadily crashing.

"The overheatting of the motor was due to its newness and the very hot engine, but I believed that the motor was not overheated, so I continued on. According to the map the referee ran almost straight to the South as far as Tegucigalpa, which was about 10 miles. After a moment I discovered that it ran in the general direction of S. E. and that it made many great curves around the mountains. There was only one or two places where it might be possible to land the machine in case of necessity, but I should not care to be forced to try it.

"Twenty minutes later I packed up the tools (typewriter, etc.) from the machine and took off again. I had to fly over the map and see in order that I would find the lake de Yojoa. Failing to find the lake at the proper time I headed East and packed it up at 14,000 ft., but the map was some twenty miles out of the way. Until I packed up, the lake, the whole distance had been over absolutely unknown ground and mountains that ran straight up and down, and no valleys between. Between the lake at 14,000 ft. and with the motor running, and many miles to the south, I was lost.

"For the next two minutes I was over a large upland plain about 1000 ft. as I steamed that I packed up the wings ready to the capital and heading due East I located Gwynnepanga at an elevation of 13,000 ft. I tried to get to the front tank, opened the throttle a lot more, above my mistakes for horizontal flight, and the air speed reached 110 m. p. h. and stopped the machine. It was extremely cold especially in my head, and the wind would get into my ears and burn them to the bone. The air was quite heavy and the map could only be read after, as I landed toward Gwynnepanga, leaning that I would be able

to pick up the peculiar shaped mountain I had noticed when passing through on a mule several months before.

"Again luck was with me, for I picked up the mountain and crossed and crossed down the mountain until she was high 130 m. p. h., because it was beginning to be rather late to be wandering around in the air in an uncharted country. Five minutes later I saw the city to my left and about 16,000 ft. elevation. Two hours later I landed in Tegucigalpa, where I began to make arrangements to get back to the United States.



DEAN IVAN LAUCK, CHIEF OF AVIATION, REPUBLIC OF HONDURAS

mountain. I was touching 16,000 ft. at the highest point of the range and the peaks certainly did look unconfined close. Just at this point all the air traps, cross currents, and winds of the world seemed to have gathered, and for awhile it was more than unpleasant flying.

"It was very necessary during cloudy as well as sunny days, and I was forced to wear down a bar in order to distinguish the terrain road, but this was only more confusing, because I could not distinguish roads from the road. Then I picked up a side that was not shown on the map and that I had never heard mentioned. I admit that I was lost, because I should have been in sight of the city by then. So I made a long circuit around the lake, a few miles, larger circles, and when I arrived for the second time, which happened to be at Gwynnepanga, I was home to the West. Having made out a moment later I came out

slightly over Tegucigalpa, well within the hills.

"I certainly did not go to me, so I made a couple of



## Naval Aviation in August

The U. S. naval airship ZR-2, completed and tested in the shed and on a short flight, according to news dispatches from London will be due in the United States about August 15, with the U. S. Navy Detachment which had been on duty during the ship's construction operating the dirigible on her voyage to this country, under command of Capt. Louis D. Marshall. The ship's crew will be about 100, including the pilot and mechanics. The ship will be piloted by D. B. Holtzman, who is reported to be the only one to have delivered the ship to the U. S. Navy. Lt. Comdr. A. T. T. U. H. R. P. has been assigned to make the trip aboard the ZR-2, and left the U. S. S. Utah for Cherbourg on July 5. Major Percy E. Van Nostrand, U. S. A., of the office of the Chief of Air Service, will also be a passenger and will probably make the voyage to Europe on the U. S. A.

Naval aviation in the Far East, has constructed the Cagayan River, so far as Cagayan, and is now proceeding

down this fine river through the mountains into the Cagayan valley, and eventually to Apayao at the extreme north of the Island of Luzon.

"There is no question but that in a mountainous and hilly country of which no accurate maps exist, the service that could be offered by several flights over proposed lines would be enormous, and I anticipate in a short time all railroads through this hilly country will be preceded by airplane investigation."

## Italy's Surplus Aircraft Equipment

Lt. Col. A. Gordon, Italian Air Attacks, has informed the Chief of Air Service that, owing to certain warlike circumstances, he has no surplus aircraft material which they can turn over to the Government, but the Department of State, through the Superior Command for Aeronautics, has issued the following statement:

"For the information of all concerned, the War Department (Superior Command for Aeronautics) announces that no individual or agency has been charged with the sale of surplus aircraft material belonging to the Government, whether surplus from the war or otherwise, but that the Department will provide for the sale of such surplus material directly or through the 6th Committee of Allocation."

"Regarding certain material previously sold and later used for speculative purposes and represented as an flying condition without the necessary inspection by technical specialists, the War Department emphasizes that the Government cannot give any guarantee of the efficiency of such material, as it will not be responsible for any damage or loss which may result directly or through the 6th Committee of Allocation and the War Department's authorities have been issued."

"This statement is also for the protection of the good name of the Italian Aeronautical Construction Industry."

## Royal Aero Club Scopriore Races

The Royal Aero Club of the United Kingdom Scopriore races will be held at Cowes, Isle of Wight, on Aug 1 and 2, 1921. The first race will be the Isle of Wight Handicap over a course of 80 nautical miles, from a point off Cowes to Ventnor, out and back runs, passing Ryde, the Needles and Freshwater. The race will be a trophy of the value of £200 presented by Mr. F. K. McLean, and £500 presented by the Royal Aero Club.

The Robert Scott Trophy will be held on Aug. 2, over a course of approximately 80 nautical miles, over a circuit of 20 nautical miles, situated in the Solent. Four laps of the circuit must be made to complete the course. The circuit will include a point off Cowes, St. Mary's Fort, Horse Sand Fort, and Spitsand Fort. A prize of £250 will be presented by the Royal Aero Club.

## International Balloon Race

The Balloon Committee of the Aero Club of America has selected the following teams to represent America in the International Balloon Race to be held in Brussels, Belgium: Ralph Duson, Bernard Von Hoffman, and Wade T. Van Ostrand. Preparation is rapidly being made for their participation in this event and we have a good chance to bring the Gordon-Bennett Cup back to America.



On this occasion the account of the survey by Capt. Eugene E. S. Pomeroy will be of interest as it bears testimony to the value and saving of time and money of the aerial reconnaissance in engineering projects. Mr. Pomeroy's six words:

"The flight was in the nature of a trial trip as I had never been up in the air before and had no idea whether my information of real value could be utilized or not. The trip was a revelation to me and I cannot understand why anyone

were never used before in reconnaissance surveys, for as much can be accomplished in one day with a plane as would take months of time and thousands of dollars to do by instrument surveys. The flight was at the beginning of the rainy season and shortly after our arrival at the point the clouds began to form and we were able to obtain the necessary information and the earliest return. However, I obtained enough information on this trip to demonstrate how much could be done by flights in the dry season, as it was, I can eliminate two days on this trip that the engineers on survey would necessarily have had to try, and which would have taken many months and great expense to make."

"The present U. S. Naval Air Service, has constructed the Cagayan River, so far as Cagayan, and is now proceeding down this fine river through the mountains into the Cagayan valley, and eventually to Apayao at the extreme north of the Island of Luzon.

"There is no question but that in a mountainous and hilly

country of which no accurate maps exist, the service that could be offered by several flights over proposed lines would be enormous, and I anticipate in a short time all railroads through this hilly country will be preceded by airplane investigation."

The Navy will turn back to the treasury approximately \$1,800,000 as an unexpended balance for the naval aviation appropriations for 1921. The unexpended balance of the 2nd is due to the fact that the Navy did not receive the intended budgeted sum at Camp Kearny for the reason that the War Department declined to turn over a portion of the camp for the purpose.

## Manual on Navy Aviation

In order that line officers of the Navy may have an opportunity to study aviation, the Bureau of Navigation has approved the plan for the compilation of a manual on the general subjects of aviation, organization, activities, apparatus, engines, explosives, sea, airship, ships and other elements. When the manual is completed and approved, it will be issued to the line officers of the Navy, and thereafter questions on aviation based upon the general subject as treated in the manual, will be part of the examination of line officers. The plan is now under way, but it is not expected that either the manual or the questions for examination will be ready for use much before the first of next year, or possibly later. A tentative series of questions was submitted to the Bureau of Navigation as an outline of the subject which should be covered in the new manual.

## Naval Power for War

Acting Supersecretary of the Navy Roosevelt has asked the House Committee on Naval Affairs to include in the Legislative Manifesto for 1922 a provision "that naval aviation shall have regular usage of the aerial operations necessary to plan and execute command of the sea and of naval stations and ports as are necessary to insure adequate aerial patrol of the coast of the United States." The Committee has been requested to include this provision in the Legislative Manifesto.

Mr. Roosevelt, in his statement, says: "The Navy is now engaged in keeping open the sea lanes for coastal shipping. This, says Mr. Roosevelt, "is an integral part of the Navy's duty and was the major work it performed in aviation during the last war. The Navy's development of aircraft is toward types that can perform this duty. In war time the Navy will have to and should do this work and these types will not have suitable planes for it, at present. Army planes are not suitable for this naval function, in land defense. It is extremely desirable as a matter of national safety that Congress fix responsibility by law for the defense of the United States in conformity with the approved plans of the War and Navy Departments as promulgated by the Joint Board."

## Trade Note

NEW TOOLS ANNUAL. (The Industrial Press, New York, 90 pp.)

From among or dealing in tools and machinery for aircraft and other manufacture will be well repaid by a perusal of the pamphlet published by Moseley's. The annual is in two parts. The first part is a condensed summary for buyers and sellers of machine tools and other mechanical equipment, described as Moseley's from April, 1920, to March, 1921. This is arranged alphabetically, with a reference to the section in which the company description appears. The second part is Moseley's Price Index.

The pamphlet is well arranged and admirably suited for reference to product and manufacturer.

## New York to Cleveland by Flying Boat

Following the route of the value flying boat Santa Maria of the Aeromarine Airways, Inc. in its recent flight from New York to Toronto, Cleveland and Detroit, another Aeromarine Santa Maria boat of the HS-2L type will leave New York with a companion of five passengers, pilot and mechanic. The companion will be piloted by D. B. Holtzman, who is reported to be the only one to have delivered the ship to the U. S. Navy. Lt. Comdr. A. T. T. U. H. R. P. has been assigned to make the trip aboard the ZR-2, and left the U. S. S. Utah for Cherbourg on July 5. Major Percy E. Van Nostrand, U. S. A., of the office of the Chief of Air Service, will also be a passenger and will probably make the voyage to Europe on the U. S. A.

The Santa Maria has been purchased from the Aeromarine Co. by the Great Lakes Airways Co., Inc., and will operate with others in the Aeromarine Airways, Cleveland, the



SHIPPING MALLINER VIA AEROMARINE AIRWAYS  
Photo Courtesy of Aeromarine

purpose of the trip is not only to deliver the ship to its new owners, but also to demonstrate to shippers of passengers and other crew bodies of cities as great the practicability of flying boats for transportation. Mr. Holtzman will be in charge of this work and will give several talks by invitation of civic bodies.

The route the HS-2L flying boat will fly is as follows: New York to Ticonderoga via the Hudson and Lake George, to Saratoga, N. Y., on Lake Champlain, across the lake to Plattsburgh, N. Y., to Montreal, St. Lawrence River to Ogdensburg, N. Y., Thousand Islands, Alexandria Bay; via Lake Oneida to Oneida, N. Y., to Utica, Oneida Falls, Herkimer, Utica, Oneida, Liverpool, Oswego, Seneca Falls, Baldwinsville, N. Y., over Niagara Falls to Buffalo, Erie, Pa., and Cleveland, Ohio.

The Great Lakes Airways Co. proposes to use a flying boat service between Cleveland and Detroit with a fleet of four HS-2L six-seater flying boats. The officers of the company are T. P. Clegg, president; Arthur H. Darr, vice-president; W. E. Clegg, manager of flying boats; L. E. Clegg, manager of a share of truck and busineess departments; W. F. Ladd, treasurer; Benjamin A. Gage, secretary. The directors of the firm are Clarence A. Pfeifer; J. M. McLellan and Myron H. Wilson, Jr.

## Naval Appropriation Bill Passed

The naval appropriation bill for the fiscal year 1922-23, as introduced by the conference committee of House and Senate, was adopted by both Houses of Congress on July 13. The bill contains a total appropriation of \$416,000,000.

The construction of one aircraft carrier at \$30,000,000 is authorized and permission is made for the proposed naval air station at Naval Air Station, Naval and Coast Reserve, Cagayan, Philippines, at a cost of \$60,000,000. The naval appropriation bill was introduced by the conference to the amount carried for this purpose in the original House bill, is retained in final draft of the bill and so is the provision for a Bureau of Aeronautics.

## Foreign Aerial Transport

London-Paris Service

It is announced that the air service between Paris and London, operated by the Compagnie des Grandes Express Aériennes, will be increased to four services weekly in each direction, starting on Friday, Monday, Wednesday, Thursday and Friday, and London on Tuesday, Thursday, Friday and Saturday. It is intended ultimately to run a daily service. The fare, except in addition to and less than connections with the Blériot-Pége and Intime London-Paris services.

The Delhaize and Co. intends to run a third D.H. 18 passenger airplane capable of carrying 8 passengers and luggage at a speed of 100 miles, the operating cost of which, including all overhead charges, will amount to a fraction of over \$50. per mile per passenger, or no more than the present railroad first-class fare.

## Belgian Congo

It is reported that the directors of the Foresteau Diamond Mine Co. have suggested the inauguration of an air service by airplane, which would operate between the towns of Dyaklo Foula, on the Kasai (a tributary of the Congo), and Kinschasa, on the Congo, from which latter point the railroad runs to Matadi, a distance part on the lower Congo. The distance from Kinschasa to the coast is 100 miles, and the distance from Matadi to the coast is 100 miles. In the meantime a survey of the route is being undertaken. The distance from Kinschasa to the coast is approximately 200 miles, which could be covered in two days, as contrasted with over a month by the existing river transport.

## French Guinea

From French Guinea comes another lesson. Along the River Maroni are valuable gold and forest workings, which have hitherto been handicapped constantly by the distance and discomfort of the river transport, effected mainly by canoe. Passengers and goods, owing to the rapids, have to be handled frequently on the river banks, and then once more by boat. Now, however, by a series of French negotiations, a voyage up the Maroni, which takes some twenty days by canoe, may be accomplished in a few hours by air.

Apart from the benefit which the Dominions' Prince Consort can bring to their own territories by the introduction in suitable districts of "airways," says the London Times, "the development of airmen, aircraft and methods of maintenance and equipment for them is of vital interest to the aircraft industry. Designers and constructors are in a position to provide seaplanes and flying-boats for coastal, river, or inland flying. There is being developed a new school of design in comparatively slow-flying, big-load transport airplanes which would be particularly useful for military purposes, and which, in view of the present state of the art, the design of which would be of great interest to the experts of the Royal Flying Corps. Flying from or alighting on either land or water, should be especially interesting to some of the Dominions."

## Anglo-Danish Agreement

According to a report by Count George H. Moltke-Munk, English and Danish signed on Dec. 23, 1920, an agreement relative to serial navigation between the two countries. The memorandum of the agreement is as follows:

In Denmark seaplanes and hydroplanes must descend at Christians Havn, in England seaplanes at the present air-dromes, and hydroplanes at Filton.

The crossing over the Danish frontier may be made at any point, but the English seaplanes must enter between Falmouth and Penzance and hydroplanes must enter between Orfordness and the Ness.

## Aerial Police in Michigan and Canada

Two police organizations which are adding airplanes to their equipment are the well known Royal Canadian Mounted Police and the Michigan State Police.

The first organization intends to run aircraft in their patrol areas, where drivers and traps are used for trapping such trouble. The Michigan State Police is also planning to check "non-crossing" by means of aerial patrols, for the use of which several air stations are being established throughout the State.



## CALIFORNIA

SAN FRANCISCO, CALIFORNIA  
EARL P. COOPER AIRPLANE & MOTOR CO.

## ILLINOIS

CHECKERBOARD AIRPLANE SERVICE  
FOREST PARK, ILLINOIS

## INDIANA

One of the largest and best equipped flying fields  
in the United States  
CURTISS-INDIANA COMPANY  
Elkhart, Indiana  
ALL TYPES OF CURTISS PLANES.

## LOUISIANA

GULF STATES AIRCRAFT COMPANY  
SHREVEPORT, LA.

## MASSACHUSETTS

BOSTON AND SPRINGFIELD, MASS.  
EASTERN AIRCRAFT CORP.  
349 FIRST ST., BOSTON, MASS.

## MINNESOTA

WHITE BEAR LAKE, MINN.  
The Twin Cities International Flying  
Harold E. Thompson, President  
COMPANY  
SCHOOL OF AVIATION

## NEW YORK

AEROMARINE AIRWAYS, INC.  
Times Building, New York City.  
12 Passenger Flying Cruises—6 passengers, open and enclosed Flying Buses, Lightening Tours—Flights to Shore and Lake Resorts.

## NEW YORK &amp; NEW JERSEY

OFFICES FIELD, GARDEN CITY, LONG ISLAND  
KELVINWICH FIELD, BUFFALO, N. Y.  
FLYING STATION, ATLANTIC CITY, N. J.  
CURTISS AIRPLANE & MOTOR CORPORATION

## OHIO

DAYTON, OHIO.  
Supplies, Materials, Repairs and 2 Miles from Dayton Radio.  
JOHNSON AIRPLANE & SUPPLY CO.

## OREGON

LAND OR WATER FLYING  
OREGON, WASHINGTON AND IDAHO AIRPLANE COMPANY  
PORTLAND, OREGON

## PENNSYLVANIA

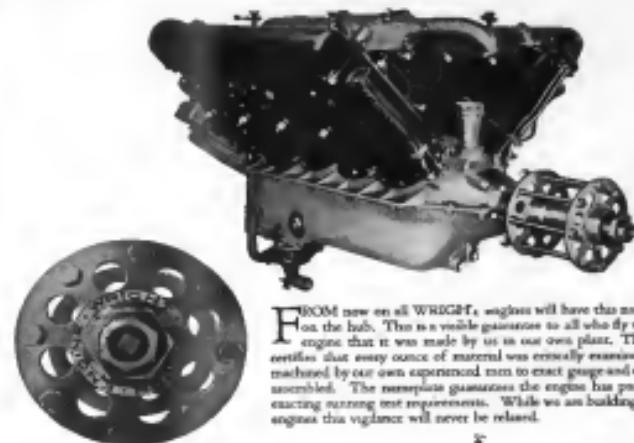
Prince School and Commercial Aviation  
Official Flying Field, Avco Club of Pennsylvania  
PHILADELPHIA AERO-SERVICE CORPORATION  
12th Best Lease Trust Building, Philadelphia.

## WISCONSIN

CHESTER-WISCONSIN AIRPLANE CO.  
FLYING SCHOOL  
GEORGE E. WISCONSINER, President, Milwaukee, Wis.

If you are one of the companies in your state having first class facilities for passenger carrying, pilot's training and special flights, you should be represented in WHERE TO FLY next week.

36 Consecutive Insertions \$250.00



The identification of  
Incompatible Service

The seven absolute requirements for aircraft engines are fulfilled in the two models of Wright engines now in production and being sold.

## THREE REQUIREMENTS ABSOLUTELY IN PLANE OPERATION

1. Lightness per horsepower. Greater useful load, increased performance.

2. High power. Speed, climb, power reserve.

3. Low fuel consumption. Economy, long range radius, increased useful load.

4. Short overall length. Increased maneuverability, compact installation.

5. Distinguishable just by look. No long repair periods, economy, safety.

6. Dependability. Many Wright engines have been flying for years.

7. Economy. The Wright engine has the lowest cost of all flying engines.

The remarkable Wright engine has made the life of the flying engineer easier and more comfortable.

The unique qualities and requirements, Skill, experience and continuing vigilance make these engines the most reliable in the world.

Compare the characteristics of these great engines now in production with any engine built—foreign or domestic.

## WRIGHT 16-H.P.

Power at 1600 R.P.M. 16 H.P.

Weight, 160 lbs. 160 lbs.

Gas per H.P. hour. 60 lbs.

Overall length, including hub and prop. 4' 11".

NOTE.—The power given is the same rated power, every individual engine gives higher power and lower consumption.

## WRIGHT 24-H.P.

Power at 1600 R.P.M. 24 H.P.

Weight, 240 lbs. 240 lbs.

Gas per H.P. hour. 60 lbs.

Overall length, including hub and prop. 4' 11".

NOTE.—The power given is the same rated power, every individual engine gives higher power and lower consumption.

WRIGHT AERONAUTICAL CORPORATION  
PITTSBURGH, PA.

W R I G H T  
AERONAUTICAL ENGINES  
STANDARD MOTIVE POWER FOR ALL AIRCRAFT





## The Laird Swallow

*America's First Commercial Aeroplane*

EXPERIENCED pilots sets at once from the specifications of the Laird "Swallow" its remarkably light weight, low horsepower and small dimensions, as compared with its large carrying capacity and proved splendid performance. The resultant low operating cost is the goal of every company or individual operating airplane passenger or freight for profit. "Swallow" Distributor Franchises are paying well - some yet to be awarded.

### E. M. LAIRD COMPANY

MANUFACTURED

WICHITA, KANSAS  
General Sales Office

2216 SO. MICHIGAN AVE., CHICAGO.

Mr. Alexander, President  
2216 So. Michigan Ave., Chicago, Ill.  
Please send the enclosed coupon for your new booklet on "The Laird "Swallow".  
Name \_\_\_\_\_  
Address \_\_\_\_\_

### Learn to Fly at Bridgeville, Pa.



Passenger Flights, Advertising, Photographic, Flying Instruction  
MAYER AIRCRAFT CORP., Bridgeville, Pa.

### Worwick NON-TEAR Aero-Cloth

#### A SAFE CLOTH for FLYING

For Particulars Apply to

WELLINGTON SEARS & CO.  
46 Worth Street, New York

### AMPHIBIOUS LANDING GEARS

Write for Particulars

ALEXANDER KLEMIN & ASSOCIATES  
CONSULTING AERONAUTICAL ENGINEERS  
22 East 17 Street New York City

### INDEX TO ADVERTISERS

A	
Aeronca Plane & Motor Co. ....	96
Aircraft Materials & Equip. Corp. ....	117
Aircraft Service Directory ....	118
B	
B. & B. Corporation, The ....	117
C	
Curtiss Aeroplane & Motor Corp. ....	92
D	
Detroit Wright Co. ....	92
Diggins, Ralph C., Co. ....	117
E	
Elkins Alexander & Associates ....	116
F	
Farnboro Stewart Co. ....	117
Hall, Daldin & Co., Inc. ....	119
G	
Globe Alexander & Associates ....	116
H	
Hartshorn Stewart Co. ....	117
I	
Irish, R. M., Co. ....	116
M	
Major Petroleum Co. ....	120
Martin, The Glass L. Co. ....	94
Mayer Aircraft Corp. ....	116
N	
Navy Department ....	118
P	
Thomas-Morse Aircraft Corp. ....	112
Topper Max & Rosenthal ....	122
W	
War Department Air Services ....	104-180
Wellington, Evans & Co. ....	128
Wings to Fly ....	112
Wichita Aircraft Corporation ....	119
Wright Aeronautical Corp. ....	113

COMMERCIAL SPEED  
FLYING IS A MUST  
IN THE AIRPORT.

### LEARN TO FLY!

IN CHICAGO WISCONSIN

THE RALPH C. DIGGINS CO.

You may be flying the day you receive. Complete Instruction.

Through Ground Course, including instruction in motors, engines, propellers, landing gear, etc. Flying instruction in all weather conditions. Living quarters fully have on the field.

PHOTO Reserve \$2000 Per Year and Up

ENROLL NOW!

Write for Information and Enrollment Offer.

THE RALPH C. DIGGINS CO.

Dept. 206 140 N. Dearborn Street Chicago, Ill.

### The Spark Plug That Cleans Itself

# B. G.

Contractor to the U. S. Army Air Service &amp; the U. S. Navy

### THE B. G. CORPORATION

33 GOLD STREET

NEW YORK CITY U. S. A.

# CANUCK

AND

OX5 ENGINE SPARE PARTS

IMMEDIATE DELIVERY

CAL. PROPS. \$28 PARAGON PROPS. \$36

ROME-TURNETT RADIATORS \$23

ALSO COMPLETE ASSORTMENT OF STANDARD UTILITY PARTS

GET OUR PRICES BEFORE ORDERING

AIRCRAFT MATERIALS &amp; EQUIP. CORP.

1000 BRONXWIC AVE. NEW YORK CITY

### HARTSHORN STREAMLINE WIRES

Associated with Hartshorn Streamline Steel Rods make the ideal Aeroplane. The rods eliminate wind resistance reducing greater speed.

This fact was proved in the speed test for the Pulitzer Trophy. Two of the fast five ships were equipped with Hartshorn Streamline Tie Rods.

Write for circular A-1 describing our Wires and Steel Rods.



STEWART HARTSHORN CO.  
405 FIFTH AVENUE, NEW YORK



# Lakeside Aviation Oil



## This Lubricant has a Pedigree

The aeronautical motor demands a lubricant of unprecedented efficiency. From the crucible of many block and field tests has come the one lubricating oil possessing the required stamina —

### Lakeside Aviation Oil

*Scientifically Refined from Famous Franklin First Sand Crude*

Continuous maximum fire, flash and viscosity—an unbreakable film — an average consumption rate of 4 quarts per hour in a Liberty Motor — these are the dominating features of LAKESIDE AVIATION OIL, produced from that World Famous Crude — Franklin First Sand Crude.

Added to this distinctive pedigree is the scientific refinement of LAKESIDE AVIATION OIL — a process representing two years of research and development. Today, the economy and efficiency of LAKESIDE AVIATION OIL are almost a miracle.

Write for a copy of the Textbook of Aeronautical Lubrication — invaluable to all who follow aeronautics. It's free.

We are the producers and distributors of LAKESIDE AVIATION OIL, scientifically refined from famous Franklin First Sand Crude. Send for quotations and particulars.

## THE C. L. MAGUIRE PETROLEUM CO.

*First In Aviation Petroleum Products*

MCCORMICK BLDG.  
Chicago, Ill.

WHITEHALL BLDG.  
New York, N. Y.

LYNCH BLDG. MUNSEY BLDG. 661 PELHAM ST.  
Tulsa, Okla. Washington, D. C. St. Paul, Minn.

FRANKLIN, PENNSYLVANIA

